

DYNAMIC TACTILE INTERFACE**CROSS REFERENCE TO RELATED APPLICATION**

[0001] This application is related to U.S. patent application Ser. No. _____, filed Mar. 3, 2009, and entitled *Elastomeric Wave Tactile Interface*, Attorney Docket No. COW-008-1.

BACKGROUND

[0002] The disclosure relates to tactile interfaces, and more specifically to dynamic tactile interfaces.

[0003] Tactile devices with displays and interfaces are becoming increasingly important as computing, communications, and gaming platforms proliferate and as their capabilities increase. Developers are continually looking for additional ways to convey information, and for novel and differentiating human interfaces.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] The following detailed description will be better understood when read in conjunction with the appended claims, taken in conjunction with the accompanying drawings, in which there is shown one or more of the multiple embodiments of the present disclosure. It should be understood, however, that the various embodiments of the present disclosure are not limited to the precise arrangements and instrumentalities shown in the drawings.

[0005] In the Drawings:

[0006] FIG. 1A is a side view illustrating a dynamic tactile device with a touch screen interface;

[0007] FIG. 1B is a side view illustrating an “indent” state of a cell according to the dynamic tactile device of FIG. 1A;

[0008] FIG. 1C is a side view illustrating a “bump” state of a cell according to the dynamic tactile device of FIG. 1A;

[0009] FIG. 2A is a top-down view illustrating the dynamic tactile device of FIG. 1A;

[0010] FIG. 2B is an elevated view illustrating excitation of individual electrodes according to the dynamic tactile device of FIG. 1A;

[0011] FIG. 3A is a circuit diagram illustrating a charge circuit according to the dynamic tactile device of FIG. 1A;

[0012] FIG. 3B is a block diagram illustrating an addressing scheme according to the dynamic tactile device of FIG. 1A;

[0013] FIG. 4A is a block diagram illustrating an electronic device including embodiments of the dynamic tactile device of the present disclosure;

[0014] FIG. 4B is a side view illustrating a user-interface surface according to the dynamic tactile device of FIG. 1A;

[0015] FIG. 5 is a flow diagram illustrating a method of exciting electrodes according to the dynamic tactile device of FIG. 1A; and

[0016] FIG. 6 is a block diagram illustrating a computer and/or architecture through which the multiple embodiments of the present disclosure may be implemented.

DETAILED DESCRIPTION

[0017] In the following detailed description, reference is made to the accompanying drawings, which form a part hereof. In the drawings, similar symbols typically identify similar components, unless context dictates otherwise. The illustrative embodiments described in the detailed description, drawings, and claims are not meant to be limiting. Other

embodiments may be utilized, and other changes may be made, without departing from the spirit or scope of the subject matter presented here. It will be readily understood that the aspects of the present disclosure, as generally described herein, and illustrated in the Figures, can be arranged, substituted, combined, and designed in a wide variety of different configurations, all of which are explicitly contemplated and make part of this disclosure.

[0018] Briefly stated, the multiple embodiments of the present disclosure include a method of exciting a dynamic tactile interface having a plurality of electrodes including identifying an area within an image that is capable of tactile feedback and identifying a first subset of the plurality of electrodes in the tactile device that correspond to the areas. A voltage is applied to the first subset plurality of electrodes to create a desired state for each electrode corresponding to the areas capable of tactile feedback.

[0019] A dynamic tactile interface includes an electrostatic film, a plurality of electrodes, a plurality of support members located in between and perpendicular to the electrostatic film and the plurality of electrodes, and a plurality of charge circuits coupled to the plurality of electrodes. A controller is configured to determine areas within an image that are configured for tactile feedback, determine a subset of the electrodes that correspond to the areas, and send an excitation signal to excite the first subset of electrodes. The dynamic tactile interface can be implemented as part of a viewable display type of device, or as a device without any viewable display.

[0020] A dynamic tactile interface for use in devices with touch screens is disclosed. FIG. 4A is a block diagram illustrating an electronic device **402** including the dynamic tactile interface **10** of the present disclosure. The dynamic tactile interface **10** allows all or portions of an image to be presented to a user **401** through their sense of touch. The dynamic tactile interface **10** may enhance the user experience by placing a “bump” **116** or “indent” **114** in specific areas of the device where tactile feedback is beneficial. The dynamic tactile interface can be implemented as part of a viewable display type of device, or as a device without any viewable display. In some embodiments, a tactile image or portion of a tactile image corresponding to a visual image **14** is presented through the dynamic tactile interface **10**. For example, in order to improve the accuracy of finger-based text entry, tactile feedback is provided to the user **401** in certain areas of the dynamic tactile interface **10** that correspond to areas of a displayed visual image **14** that require tactile feedback. In some embodiments, the dynamic tactile interface **10** presents information that is not intended for visual display, such as Braille or other information that is only to be presented by a tactile interface.

[0021] In the case of an image that can be presented for visual display, a portion of the image, such as a scene, background, component of the image (e.g., floor, ground) may be presented through the tactile interface. In some embodiments the user **401** views an image while information corresponding to the image (e.g., surfaces or particular information in the image) is presented through the tactile display. A processor (not shown) in combination with the appropriate software can be utilized to determine what portions of the visual image are to be interpreted or selected for display through the tactile display.

[0022] In some embodiments, the displayed visual image **14** is, for example, a graphical user interface between a user